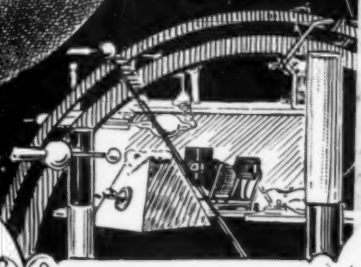
VOL. 6. No. 1. January, 1900.

THE AMERICAN X-RAY JOURNAL

A MONTHLY DEVOTED TO THE PRACTICAL APPLICATION OF THE NEW SCIENCE AND TO THE PHYSICAL IMPROVEMENT OF MAN.



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ST. LOUIS, MO.

THE AMERICAN

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Devoted to Practical X-Ray Work and Allied Arts and Sciences.

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JOHN TOWNSEND PITKIN, M. D.

The American X-Ray Journal.

Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. 6. *ST. LOUIS, JANUARY, 1899.* *NO. 1.*

X-RAY LIGHT TUBE.

We illustrate here two of the x-light tubes made by Messrs. Oelling and Heinze. We can best describe these by first mentioning some of the observations Dr. Rollins has made in connection with x-light, in accordance with which he has designed these tubes. He has shown that for practical purposes x-light is a hydrogen phenomenon, the light originating in this way: The cathode is a storehouse of hydrogen, the particles of which under the electric stress are repelled by its concave surface, because, as shown by Crookes, they have charges of like sign. These particles, traveling with high velocity toward the anode, are attracted by it because their charges are of opposite sign, and striking suddenly have their temperature raised to a very high degree. As a result they vibrate, throwing the ether into waves unlike those of ordinary light, because of greater frequency and shorter trains, which quickly diminish both in amplitude and frequency, for the particles lose heat rapidly, on account of their small size. As the velocity depends not only upon the degree of repulsion between the particles and the cathode, but also upon the attraction of the anode, it is evident that the target on which they strike should be an anode, otherwise the efficiency of the tube is less.

After a tube has been used for a while its efficiency diminishes. The vacuum may be lowered by the usual potash regulator or other similar device, but the capacity for producing x-light is only temporarily restored, for water vapor cannot take the place of hydrogen which has been used up. To overcome this difficulty the experimenter named invented the intermolecular regulator, which allows hydrogen to be introduced from the outside through metal tubing forming part of the walls.

The definition of a tube depends upon the impact area on the target being as

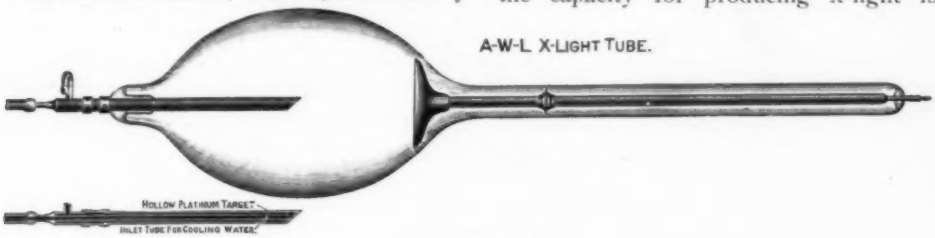

FIG. 1.—SCALE ¼.

small as possible. To produce this result the target must not be placed at the centre of curvature of the cathode, as directed by previous experimenters, but always beyond this, as was first done by Frei. Dr. Rollins has shown that the distance varies with the charge on the particles—the greater their mutual repulsion, the further the focus will be from the cathode. When the force of a powerful generator is concentrated on a small area of the target, this is quickly melted. To avoid this he has made the target hollow and cooled it. A more detailed account of x-light phenomena may

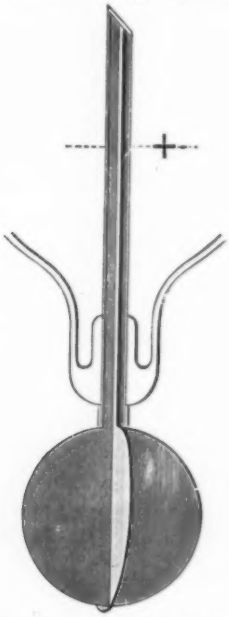

FIG. 2.—COPPER VANE FOR COOLING TARGET OF A-W-L TUBE.

be found in a series of notes by him in the *Electrical Review* during the last two years and in his papers in this journal.

Fig. 1 represents on a scale of one-fourth the original A-W-L-tube which Mr. Oelling has made in its present form for over two years. The target is a hollow tube of seamless platinum drawn by Baker & Co. For moderate generators it is sufficient to cool the target with the copper vanes shown in Fig. 2. For more powerful ones a rotary air compressor is furnished. For the most powerful apparatus it is necessary to cool the target by discharging a stream of water against the back of it, the waste escaping through the outer tube to any convenient receptacle. Trowbridge, Tesla, Edison and Williams cooled the discharge tube soon after Roentgen discovered that some of Lenard's rays would penetrate the human body, but this was the first tube in which a hollow target was cooled to prevent it from melting, and though it has been copied by Europeans, the copies are less efficient and inferior in design.

Vacuum Regulators: These are placed in various positions to suit customers. In the figure of the A-W-L-tube the regulator is made to support the stem of the

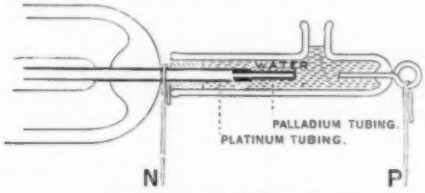

FIG. 3.—A-W-L FEEDER.

cathode. This is its most symmetrical position and the one recommended by the designer of the tube, but it exposes it to some risk of injury. It may be placed on the side of the tube instead of the usual water vapor potash regulator.

It consists of a short piece of platinum tubing, one end being sealed into the glass. The other is closed by a piece of palladium wire drilled out, leaving one end solid, the other being soldered into the platinum tube. When the vacuum is too high this tube is placed in the feeder shown in Fig. 3, which is filled with water. The wires p and n are connected with the street current through two sixteen-candle power lamps, or, if this is not available, with a series of dry cells in a convenient and portable box. When the palladium is made negative,

the hydrogen goes into the tube and lowers the vacuum. The method of supporting the terminals in these tubes deserves mention. After showing that the usual glass wrappings were not only useless but undesirable, tubes were constructed with strong terminals of aluminum three-sixteenths of an inch in diameter, which were held in place by disks of

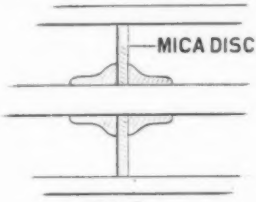

FIG. 4.

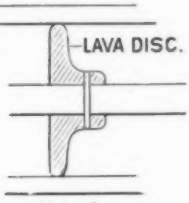

FIG. 5.

mica and lava as shown in the figures and in detail in Figs. 4 and 5.

The tube shown in Figs. 6 and 7 is of the rotary target type and is the most popular and generally useful tube of the present day, for the cooled target tube is seldom needed except by a few who have very powerful generators. When a hole has been melted in the target, a slight jar will bring a fresh surface into position to receive the cathode discharge. In this

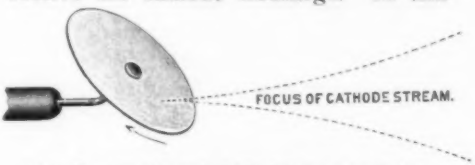

FIG. 6.—FULL SIZE BOTARY TARGET OF A-W L TUBE.

form the regulator is a piece of platinum tubing sealed into the glass. Hydrogen is introduced by heating the end of the tube in a very small hydrogen flame, taking care that the gas before it is burnt comes in contact with the metal, which is to be kept red-hot by the other part of the flame.

These tubes have come into extensive use in many large hospitals and have been used entirely by Dr. F. H. Williams in his classic work on the soft tissues, particularly those of the heart and lungs. They have been used for more than two years at the Boston City Hospital, where the amount of x-light work exceeds that of any other hospital in the world, the first observations on the heart and lungs having been made here almost immediately after Roentgen's discovery was announced.

The tubes have a certain air of distinction and are powerful, durable and

FIG. 7.—SCALE ¼. A-W-L ROTARY TARGET X-LIGHT TUBE.

graceful. Messrs. Oelling and Heinze deserve the thanks of the medical profession for having spent time and money in making them available.

EXCITATION OF THE CROOKES' TUBE BY THE STATIC MACHINE.

BY JOHN T. PITKIN, M. D.

CHAPTER XI.

In the study of the evolution of electrology we learn that the primitive form of the dynamo is found in the static machine, e. g., the field magnets of the former are the analogue of the stationary plates of the latter, the armature corresponds to the revolving disks, the commutator is represented by the neutralizing rods, etc., etc.

The electrical laws governing the placing of dynamos or batteries in series, or winding the armature coils in the same manner, for tension, or in multiple for quantity, also maintain in the similar arrangement of their prototype as a whole, or the relation of its integral portions to each other. "The electro-motive force from any electrical machine at any moment of time will depend upon the rapidity with which the armature cuts the lines of force of the fields."

Static machines containing large revolving disks, or those driven at great speed, develop currents of high voltage, while the multiplication of plates gives volume to the flow. A machine having twelve thirty-inch revolving wheels, under moderate momentum, will excite the largest Crookes' tube sufficiently for or dinary work, but there are cases, where the patient is of extra weight or unusual muscular development, where even the twelve-plate machine will be found lacking; its electrical output is inadequate. Under these unfavorable circumstances it has been our practice to couple up two static machines in simple multiple relation to each other. This we accomplish in the following manner: On the posterior aspect of the old machine we place two new prime conductors through the woodwork and attach them to the comb-holders just as they are always connected in front. We place heavily insulated wires between the prime conductors of the new instrument and the posterior arms of the old apparatus, start both machines, so that their polarity will be the same, and allow them to operate in unison, so arranged they deliver us a spark fat enough for the fattest patient's picture. It has recently been our custom in photographing difficult cases to thus operate a twelve and an eight-plate instrument in this simple harmonic relation to each other; the spark so generated has considerable thickness and gives a loud, high-pitched note, similar in tone to the discharge from a large pair of Leyden jars. The Crookes' tube in series has a very light green color throughout its interior; the target becomes red-hot, but will not fuse, and the body of the largest patient is highly illuminated. Allowing for the electrical loss between the static machines as arranged above (which is considerable) we conclude that the apparatus for the expert operator and hospital work of 1900 should have at least sixteen thirty-inch revolving plates and that in order to control its heavy electrical discharge its construction, with improved and entirely revolutionized insulation as its most important feature, becomes an absolute necessity. (See subsequent chapter.)

Here the static apparatus reaches its present limitations as a Crookes' tube exciter and must rest upon its laurels until such a time as the makers of tubes shall supply us with larger and better bulbs, and there is every reason to ask and expect from them tubes which can be employed to photograph the bones of the hip, thigh and spine, and the heart and liver, just as distinctly as the x-ray toys of three years ago skiagraphed the bones of the hands and wrist. The high tension induction coils will soon fall into disuse because their currents, being pulsatory in character, reversing either completely or incompletely in polarity with

each beat, strain and overheat the tubes; the energy employed in making this change becomes manifest, as heat bending or fusing the electrodes or the target, it is therefore not only disruptive in character, but also in its effects. The electrical flow from the static machine, on the other hand, when carefully constructed, is even, steady, unidirectional, and the tube will last for years without perforation or fusing under its uniform excitation. The skiagraphs are more distinct because a tube yielding a uniform light will not efface its own impression from the sensitive plate as sometimes happens when the x-ray light is very irregular.

BUFFALO, N. Y.

The Elmer Gates Laboruatory of Psychology and Psychorgy.

CHEVY CHASE, MD., Dec. 6, 1899.

THE AMERICAN X-RAY JOURNAL,
310 Chemical Building,
St. Louis, Mo.

Dear Editor:—In your December number of THE AMERICAN X-RAY JOURNAL is a paragraph, stating that Dr. Wagner was the first to get the impression of a spark by placing the sensitized plate between the sliding electrodes of a static machine, and before I wrote my article which appeared in *The Cosmopolitan*. I first made my experiments on August 6, of the present year, and showed them to a number of gentlemen, and they were sent to Dr. C. H. Bowen, of Providence, R. I., who showed them to scientific men in Boston, and my experiments were first published in August. I enclose a print of the first one made. The prints or electrographs were here on exhibition since August 6.

Yours truly,

ELMER GATES.

[The print of the first electrograph mentioned in Prof. Gates note is certainly a most beautiful phenomenon of an electric spark. The electrograph reached us too late to obtain an electro for use in this issue.—ED.]

A FLUORESCENT LEAD.

Some Observations in Radiography.

BY DR. ALEX. L. HODGDON, Professor of Nervous Diseases and Diseases of the Mind, Maryland Medical College, Neurologist to the Home for the Aged, Baltimore.

It is not my intention, in this article, to enter into an exhaustive discourse as to Roentgen radiancy, but principally to call your attention to some phenomena which have proven of great interest to me, and which I hope may to some extent prove interesting to others.

Having done considerable radiography for various physicians, this case has presented itself, among others, and came to me from Dr. Funck, who desired to locate, if possible, what he diagnosed as a shot in the orbit of the eye, and whose diagnosis, I understand, has since been confirmed by the removal of the eye, and the finding of two shot.

The subject of this narrative, a man about forty years of age, while hunting with his father when a boy, accidentally received the contents of the gun, the charge of number five shot striking him in his head, all of which were supposed to have been removed, with the exception of one or two, which had penetrated the eye, the shot having struck him at a slant. Placing him in a chair, I turned on the Roentgen lamp and drove the rays in an almost transverse direction through the skull, giving the Hammer Extra Fast plate an exposure of about eighteen minutes, after which, having retired to my dark room with the plate, I placed it in the developer, and proceeded to rock as usual. As I continued to sway the tray containing the developer and plate, peculiar dark, and what seemed to be irregular spots shot out upon the plate, causing me to fear that it had been light-struck, but upon closer inspection, some time after the plate had dried, I could arrive at no other conclusion but that the spots, which showed themselves positive instead of negative on the plate, were

produced by the shot, which through some means or other had become fluorescent.

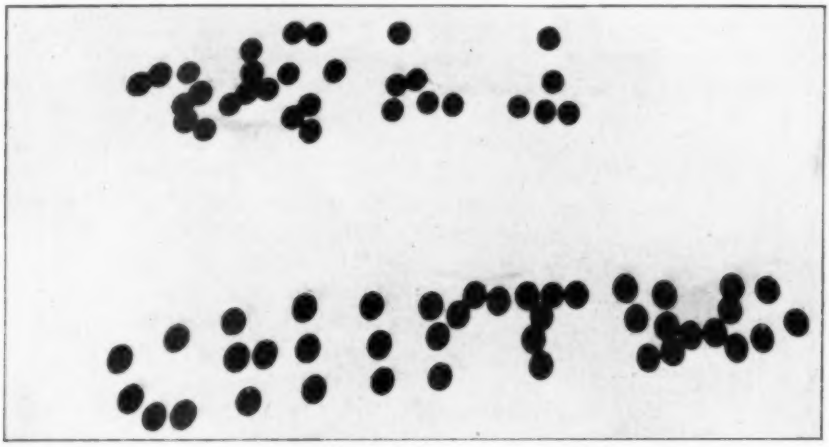

FIG. 1.—NO. 5 CHILLED AND NO. 5 SOFT SHOT.

Radiography being a comparatively new science, any investigator must expect at any moment to be confronted by some new conditions associated with this very wonderful form of light, so in so far as my knowledge was concerned, never having heard of any instance of fluorescent lead having been reported, yet having obtained something entirely different from all former investigators, I could not rest without trying to find out what gave rise to such results.

As we all know, pure lead is nearly opaque to the rays, as can be seen by glancing at the radiograph of bullets of pure lead.

FIG. 2.—NO. 5 SHOT IN HEAD.

The rays have penetrated, to a certain

extent, their periphery, but very little through their centres; consequently moulded shot, if any should be made would retard the action of the light, would come out white or clear on the plate and dark in the print or finished radiograph, as compared to the lighter detail of the bone. In this picture of the

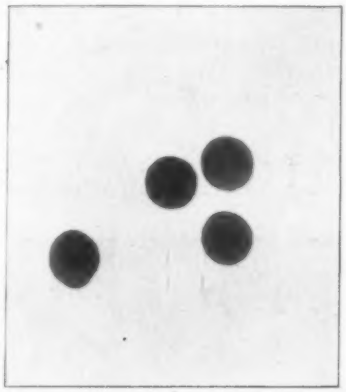

FIG. 3.—RADIOGRAPH OF PURE LEAD BALLS.

head will be noticed that the very opposite condition has occurred, and the question resolves itself into this: What is the cause of not only the shot failing to appear darker than the bone, but the bone appearing darker than the shot; the latter standing out in distinct white globules in the print, indicating that at these points the rays passed through the head to become apparent upon the plate with greater ease and less resistance than at any other point?

The answer in my mind resolved itself into this: That either there must have been a uniform necrosis of the bone at various points, of the size of number five shot (in that way decreasing the resistance to the rays), or that some of the shot before or after entering the system had become fluorescent. I chose the latter theory, the reasons for which I will now set forth, and will try to prove *that shot is fluorescent.*

The first step in the research is to exclude the possibility of necrosis. Who has ever heard of a uniform necrosis of the skull, each necrotic point appearing the size of a number five shot? Furthermore, there can be seen in the picture shot overlapping and, in one instance, at least, at the point where they overlap I noticed increased radiance which appears as a whiter area on the print, while if the substance were not fluorescent, the increased thickness would have produced greater darkness of detail. That these objects are number five shot, it seems to me, no one knowing the size of this class of shot would doubt, and to compare them more accurately it is only necessary to examine the radiograph of the number five chilled and soft shot taken upon a four by five plate; these chilled and soft shot, as will be noticed,

FIG. 4.—DIAGNOSIS BY EXCLUSION OF "LUMINERE VOIRE"—GUSTAVE LE BON.

are themselves distinctly fluorescent, many of them more so, and in different degrees from others; one, at least, of them spirting out beautifully, largely uniform in all directions, whilst others fluoresce hemispherically or crescentically, but none of them present the distinctly globular appearance of the shot which are found in the head.

How are we to arrive at a conclusion as to why shot fluoresce and pure lead does not, and explain the difference in the fluorescence of individual shot? In the first place, the bullets are pure lead, while the chilled shot contain antimony and arsenic, the soft shot only arsenic

mixed with lead. Antimony, under certain conditions, is placed by Morton on the list of fluorescent substances, but arsenic he does not mention, and as can be seen from my radiograph of arsenious acid, that it is not fluorescent, yet both the shot which contain the arsenic, and those which contain the arsenic and antimony are distinctly fluorescent. Consequently I have formed the belief that a combination of arsenic and lead is distinctly fluorescent, and the difference in the proportion of the two metals when combined creates the difference in the phenomena of fluorescence. It may be possible that the combination of lead and arsenic in varying proportions may have the power of assimilating, and then separating the various forms of rays, which may take place within the high vacuum tube, and the perfectly circular luminescence which is noticeable in the shot in the head, and which does not extend beyond the normal periphery of the shot, may be due to certain invisible anodal rays, and may not, like the Roentgen rays, be of cathodal origin, but these rays may be waves of light directly circular in their movements, whilst the hemispherical luminescence of the shot, which has been radiographed by itself, may be invisible pulsations in the ether of anodal origin.

The direct spirting fluorescence of the shot, noticeable where they have been radiographed by themselves, is probably due directly to the Roentgen rays, the child of the cathode rays, whose electrified atoms, or ions, have been filtered out, leaving merely the Roentgen rays. Roentgen rays are supposed not to show any perceptible refraction, or regular reflection, or polarization. Roentgen suggested that Roentgen light might consist of longitudinal vibrations; others have suggested ether streams, ether vortices or even streams of minute corpuscles. Thompson says:

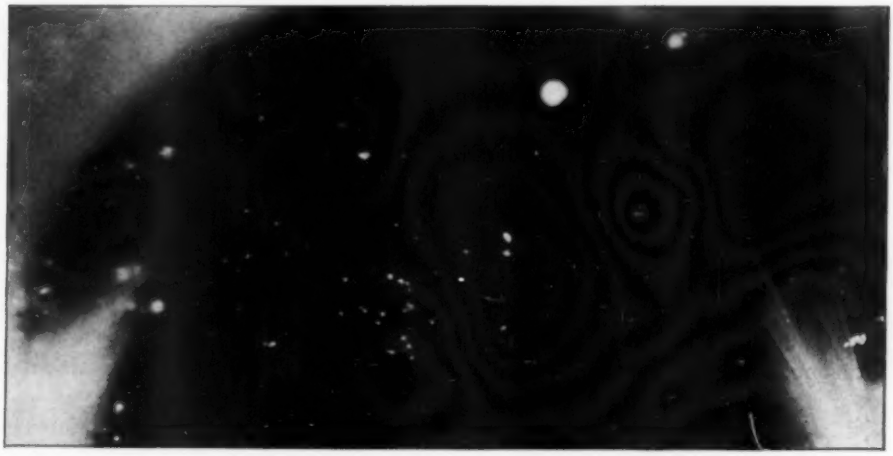

FIG. 5.—LIGHT STRUCK PLATE.

*"Invisible waves may have wave lengths that are longer than that of the red waves, or smaller than that of the violet waves."

Dr. Fomm, who has measured the wave length of the rays by interference methods, finds it about 1-15, the smallest wave of ultra violet light yet recorded. Many experimenters consider the rays non-homogeneous, but a mixture of several different kinds of rays.

In conversing with a gentleman who

for a number of years has been connected with the manufacture of shot, I was informed that a certain huntsman always manifested a desire to procure shot from a well-known firm, for the reason, he said, that it contained so much arsenic that it preserved the game. It must be remembered that this man, whose head has been radiographed, was shot long before the advent of the chilled shot, which precludes the possibility of antimony having been present, and shows that the shot were composed of arsenic and lead. That these shot-shaped spots are not due to human rays (which have been described by one investigator) goes without saying; that they are not due to the Becquerell rays may be demonstrated by the absence of uranium compounds; that they are not due to the Skodowska rays is made plain by the absence of thorium and its compounds; that they are not due to Monsieur Gustave Le Bons Luminere Noire I have demonstrated by small blank photograph taken from plate exposed to shot, the shot having been exposed to light, and the plate developed in the usual manner, but upon which no shadows of shot can be seen.

That these shot which appear fluorescent are really shot, can it would appear, be quite clearly proven by accurate measurements of same, when compared to those radiographed by themselves. That the plate was not light-struck, can be demonstrated by a photograph of a light-struck plate. The first plate, giving skiagraph of head, was developed in Pyro; all of the other plates and Velox paper I developed in Rodinal, which I prefer to all other developers, as it is good, cleanly and convenient. I have radiographed a number of metals, iodide, oxide and carbonate of lead, and arsenious acid, looking for fluorescence, but found none, excepting in the shot. I thought possibly some chemical transformation might have taken place through some change in the shot while in the body, but none of these fluoresced with the exception of the shot.

The Albion, Cor. Cathedral and Read Street.

*Light visible and invisible. Thompson Annual Cyclopoed.

THE ROENTGEN RAYS IN MILITARY SURGERY.

Surgical Radiographer to the General Hospital, Birmingham.

BY JOHN HALL-EDWARDS, L. R. C. P., F. R. P. S.,

From the report published in the *British Medical Journal* of November 4th of the arrangements made by the War Office for the transportation of Roentgen ray apparatus to the seat of war, it would appear that this adjunct to military surgery is not receiving the amount of attention which its importance warrants. Of the ten sets of apparatus provided, four only have reached South Africa, whilst two of these are located so far away from the field of operations that they must be of little service. The remaining six sets, we are told, are either on their way out, or are about to be dispatched.

It is freely acknowledged that no medical equipment for active military service can be considered complete unless an x-ray apparatus is included; it must therefore follow that, in many instances, our wounded are not having the best possible done for them. Up to the present time some 750 men have been wounded, and as it is fair to assume that in at least 80 per cent of the cases the x-rays must have proved of service, the two apparatuses in Natal must have been kept exceedingly busy, or, as is much more probable, they cannot have been used in half the cases in which they were necessary.

It has been proved beyond the shadow of a doubt that the application of the x-rays to military surgery constitutes one of the greatest advances of the century. Mr. Mansell Moullin, F. R. C. S.,

in his presidential address to the Roentgen Society, in July last, said:

"The benefit which surgery has derived from the improvements which have been effected in the use of the Roentgen rays during the past year is no less striking. Military surgery will have to be rewritten. Thanks to the ease with which suitably planned apparatus can be carried on campaign; all the wearisome and intensely painful probings after bullets and foreign bodies, to which the wounded look forward with such dread, have been swept away."

As one of the first in this country to apply the Roentgen rays to practical surgery, and as a constant worker both in hospital and private practice since, I have no hesitation in echoing the statement above quoted. It may be argued that inasmuch as in modern warfare few bullets find their billets in the bodies of the wounded, the x-rays must prove of little practical use. This is, however, incorrect, for in every case in which a bone has been injured the amount of injury can be ascertained, and the subsequent treatment arranged accordingly.

The great drawback to successful surgery in the field is the difficulty of carrying out the principles of absolute cleanliness, upon which modern surgery is founded. That at certain times and in certain places absolute cleanliness is impossible I freely admit, and knowing this it becomes all the more necessary that every possible step in the direction of securing the desired end should be seized upon. With the x-rays at command an injured limb can be examined and the injury diagnosed, the presence, shape, and exact location of a foreign body ascertained, and the amount of injury to a bone discovered, without giving the patient pain and without removing the dressings. The probe is rendered unnecessary, and dangerous manipulation can be dispensed with. In many cases all can be done with a small apparatus at a field hospital, or even at a dressing station, whilst in others the larger apparatus at the base can be brought into requisition.

After the recent Nile campaign much dissatisfaction was expressed, both in Parliament and elsewhere, because the ambulance arrangements were imperfect, and the x-rays had not been fully utilized. The Under-Secretary for War said "that there had been no case of a wounded man at the Atbara to whom the absence of the Roentgen apparatus had made any difference." That this statement was not an explanation must be patent, as the results of the application of the x-rays could in no case be foreseen. The excuse offered by the War Office was that the transport difficulties had not been overcome. Since this time the necessary apparatus has been much simplified and improved, whilst Major Beevor, myself, and others, have demonstrated that the transport difficulties are more imaginary than real.

With an apparatus I have devised I have given two demonstrations in the field in conjunction with Surgeon-Major Freer and the ambulance section of the First Volunteer Battalion Royal Warwickshire Regiment. In each instance three negatives were produced, and developed under the conditions of actual war. The apparatus (including portable 8-in. spark coil, accumulators, developing tent and stand, and box for tubes, plates, and chemicals sufficient for 100 exposures) was carried to the field in the ambulance wagon, and although it was freely jolted for a distance of six miles it worked to perfection.

Such an apparatus can easily be carried (should necessity arise) for a long march by eight men, and although small it is quite sufficient for field work; more elaborate and larger apparatus can be supplied to the hospitals. The chief difficulty previously experienced in applying the x-rays lies in the changing of the

accumulators; this has, however, been successfully overcome, and in the present war, where the line of operations will in all probability follow the railway, there should be no difficulty in this respect.

The fluorescent screen is of very little use in the field, owing, on the one hand, to a darkened room being necessary, and on the other to the fact that the surgeon in command of the x-ray apparatus is rarely the one who is entrusted with the subsequent operation. A negative or series of negatives is much more useful. as they can be placed in the hands of the operating surgeon, who can refer to them at any stage of the operation.

Even when the apparatus is working to perfection, the surgeon in whose hands it is placed must have a knowledge of photographic procedure, or his results will be useless, and in the event of anything going wrong the operator must have had considerable previous experience, in addition to a fair knowledge of electricity. I know not whether those sent out with the sets above mentioned have the requisite training to carry out their mission with success, but if they have not I can confidently predict that their efforts will to a great extent fail. If military surgery is to be rewritten after the present campaign, no expense or trouble should be spared to render the Roentgen-ray arrangements as complete as possible.

TRANSFORAMTION OF X-RAYS —Malagoli and Bonacini.—An article on the transformation of such rays by materials, in the nature of a discussion with Sagnac, who has written so much on this subject; they do not seem to agree with him.— *L'Eclairage Elec.*, Sept. 30.

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The Rentgen Rays in Spina Bifida.*

BY CARL BECK, M. D.

In speaking of spina bifida one is apt to think only of its cystic form and of its location in the lumbo-sacral region. But besides this most common type there are several others, which require to be distinguished before we can choose the proper therapy. Thus it cannot be a matter for indifference whether there is (1) a so-called simple meningocele - in other words, a hernia-like protrusion of the pia, containing cerebral fluid; or (2) a myelomeningocele, a frequent variety, which is characterized by the spinal cord expanding itself, like the optic nerve. in forming the retina, around the protrusion, and, together with the pia, constituting the sac; or (3) whether there is a myelocystocele—that is, a tumor caused by cystic dilatation of the central canal of the spine.

It is also important to discriminate whether the tumor is situated in the cervical, dorsal, lumbar, or sacral region. If situated in the cervical or dorsal region, the cord cannot protrude into the hernial sac, as it does in the lumbar or sacral portion, which corresponds to the end of the cord. It is also desirable to know whether there is a hiatus in the spinal column, and how extensive it may be; and furthermore, whether or not the fluid contained by the tumor can be dislodged into the spinal canal.

In view of these anatomical distinctions, it will be easily understood that simple meningocele gives the best chances of a cure. Whether injection treatment or extirpation, however, should be preferred, is not yet agreed upon among the profession. I have cured three or four cases of simple meningocele by repeated aspiration, followed

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1 Case presented at a meeting of the physicians of the Poliklinik, March, 1898.

by the injection of a few grams of a ten-per-cent iodoform-glycerin emulsion; and I generally prefer injecting to extirpating, provided the surface of the skin be normal. But if there be well-developed gangrene, or even any considerable abrasion of the epidermis, then septic infection of the cyst wall cannot be arrested unless immediate and extensive removal is undertaken.

On the other hand, myelomeningocele and myelocystocele offer a less favorable prospect. In these cases the injection treatment is always a failure. If in myelomeningocele the nerves are freely dispersed in the sac, the area medullaris vasculosa, after being circumcised, must be reduced into the vertebral canal, and the union of the soft tissues above must be perfected in the most minute manner. If the nerves have dishevelled themselves in the wall of the sac, the latter, after having been freely exposed, must be reduced in the same way. If situated in the lumbo-sacral region, the preservation of the nerve strings is of but little importance.

In myelocystocele the reposition should be made in the same manner. If there be any opening in the bone, protection should be sought by covering it with strong flaps, consisting of integument and muscle. It goes without saying that such delicate operations must be performed only after the most rigid aseptic precautions. Hemorrhage can be reduced to a minimum by temporary constriction, applied by a small rubber tube and by methodical interrupted compression.

According to the unanimous opinion of all authors known to me, one of the greatest difficulties encountered in the treatment of spina bifida is that its various types cannot, as a rule, be defined before operation; between meningocele and myelocystocele, indeed, the certain distinction is (often) quite impossible. Sometimes conclusions may be drawn if an opening of the bone can be palpated, or if a portion of the fluid can be reduced into the spinal canal by pressure. Paralysis of the lower extremities, of the rectum and bladder, all point to the existence of myelomeningocele; but all these signs are far from being absolutely reliable. Considering only this one point—that in meningocele aspiration should be tried first, while in the other varieties extirpation should be resorted to—it must be admitted that our deficiency in scientific knowledge makes itself felt rather strongly as regards therapy. Some authors advise opening the lower portion of the tumor first, in order to ascertain whether the spinal column is open, as in myelomeningocele, or not open, as in meningocele. Koenig and Hildebrand go so far as to emphasize the necessity of ascertaining how the nerve strings are dispersed, by first making a lateral incision into the tumor, even after they can state that there is a myelomeningocele.

All these procedures, the reason for which no surgeon would dispute until recently, are now rendered entirely superfluous by the discovery of the Roentgen rays. The skiagram shows with absolute distinctness not only whether there is an opening in the bone, but also tells of the presence and sometimes even of the expansion of the nerve substance in the sac. In those rare cases in which the presence of lipoma or fibro-myoma is in question, it is again the skiagram which gives the needed information.

The skiagram which I had made represents a formidable specimen of the lumbo-sacral type of spina bifida, and serves as an illustration of these views. The integrity of the spinal column and the cystic character of the contents of the sac are there apparent. (If any nerve

strings were present, a marked shading would be noticeable.) In this case a very extensive gangrene of the surface of the tumor induced me to resort to extirpation, which verified the correctness of the skiagram. Had there been no gangrene, I should surely, on the testimony of the skiagram, have selected the injection treatment.

The patient, a boy, was five days old when the operation was performed. While this article goes to print, four weeks after the operation, he is doing well.

Physicians' Directory.

(From Journal American Medical Association, October, 1899.)

A corps of men are now at work throughout the country procuring information for the new edition of Polks Medicl and Surgical Register of the United States and Canada. This publication is now so firmly established, so widely known and universally used as to scarcely call for any comment, as it has become standard in the profession and is a book of daily reference. It is a complete directory of the medical profession of North America and all that pertains thereto. To issue such a work is a formidable undertaking, involving a vast amount of labor, but the facilities of the Messrs. Polk & Co., are exceptional. We predict for them still greater success in the coming edition, to be issued as early in 1900 as possible, and we cheerfully commend Polk's Register to the profession as an invaluable work of reference. Each succeeding issue has been an improvement on its predecessor, and we are promised that the next number shall be as near perfect as such a book can be made.

Muscular Pains.

"The following suggestions will be of value at this season. The pains of acute influenza are something indescribable, especially when associated with high temperature. To relieve these with some preparation of opium is only to increase the cerebral congestion and aggravate the extreme prostration. Sharp, darting pains are no more severe than are the dull, heavy and persistent pains in the muscles and bones which so often obtain in this disease. Clinical reports verify the value of antikamnia in controlling the neuralgic and muscular pains, as well as the fever. In fact, antikamnia may now be called the *sine qua non* in the treatment of this disease and its troublesome sequelae.

"It seems hardly necessary to indicate the conditions, when the use of two such well-known drugs as 'antikamnia and quinine' will be serviceable, nor the advisability of always exhibiting 'antikamnia and codeine' in the treatment of the accompanying neurosis of the larynx, the irritable cough and bronchial affections. Relapses appear to be very common, and when they occur the manifestations are of a more severe nature than in the initial attack. Here the complications of a rheumatic type are commonly met and 'antikamnia and salol' will be found beneficial. Antikamnia may be obtained pure, also in combination with the above drugs in tablet form."

The January 1900 Number of the Alienist and Neurologist Contain.

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NEESEN.—He shows that the onset of Roentgen radiation is simultaneous with the development of a retarding force which brings to rest a rotating electrode consisting of a pair of vanes having metal on one side and mica on the other.—*Ver. Deutsch. Phys. Gesell*, 1, p. 69; noticed briefly in *Science Abstracts*, Oct.

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